

The bond lengths and angles of the fumarate group are similar to those reported for fumaric acid (Brown 1966, Post *et al*, 1966). The interesting features of the structure, however, are as follows :

(1) The fumarate group, unlike in the fumaric acid structure, is non-planar, one of the two carboxyl groups being twisted by as much as 35° out of the plane of the rest of the atoms.

(2) Hydrogen bonding of 2.63\AA between two adjacent molecules, forming an extensive chain of molecules inside the crystal. The hydrogen bonds, moreover, are between two oxygen atoms, both of which are of the type $\text{OH}\dots\text{OH}$ (i.e. longer of the two C-O bonds in a COOH group) and this situation is similar to that observed in the structure of bisphenylacetate, $(\text{C}_6\text{H}_5\text{CH}_2\text{COO})_2\text{HK}$, (Speakman 1949, Bacon and Curry 1957).

(3) A five-fold co-ordination of oxygen atoms around the metal ion with K^+-O distances ranging from 2.74\AA to 3.03\AA . The surrounding of the metal ions by the oxygen atoms provides for combinations of distorted octahedra and tetrahedra.

As the result (1) and (2) above have interesting points of stereochemistry and packing to settle, further work is being done to refine the structure using complete three dimensional data. As this may take some time, we are publishing here the essential features of this crystal structure and we believe that these results are not likely to be modified to any marked extent even after a full three dimensional analysis.

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COSMIC RAY FLUXES AT DIFFERENT ZENITH ANGLES

SAMIR GHOSH AND SIMA SENGUPTA

PHYSICAL LABORATORY, PRESIDENCY COLLEGE, CALCUTTA, INDIA.

(Received July 14, 1967; Resubmitted October 6, 1967).

An experiment has been performed to find out the variation of integral cosmic-ray fluxes with zenith angles. The geographical co-ordinates at the place of measurement are Lat. $22^\circ 34'\text{N}$, Long. $88^\circ 24'\text{E}$ and height from sea-level is 20 ft.

A four-fold Geiger-Müller counter telescope has been utilized for this purpose and the fluxes have been recorded by a four-fold coincidence circuit. The counter telescope has been placed under a thin Aluminium foil of 0.06 mm thickness.

The telescope has been given a rotation of 180° degrees from East to West at small steps of zenith angles. The probabilities of fluxes at different zenith angles have been plotted in fig. 1.

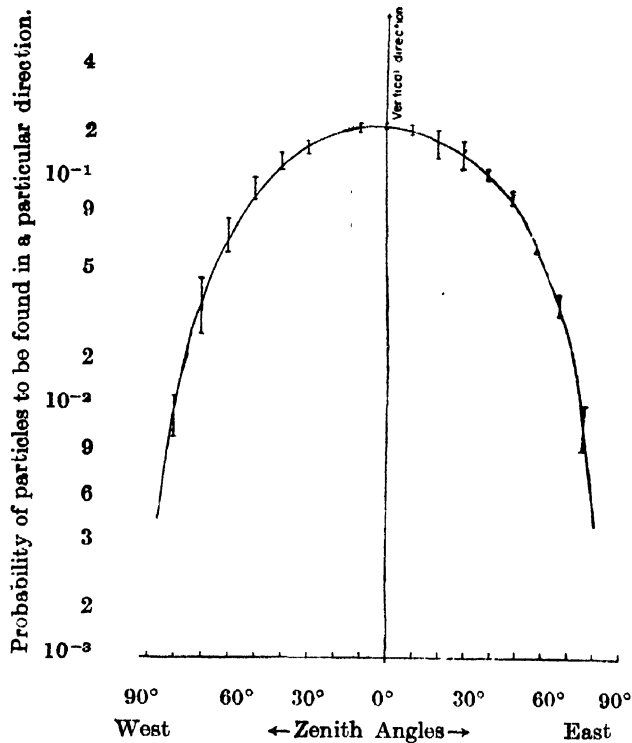


Fig. 1. Probabilities of fluxes against zenith angles.

The data presented by Allen and Apostolakis (Allen, 1961) on the variation of cosmic-ray fluxes with zenith angles in between 65° and 85° corresponds to our experimental data for the same region. They have measured particles of the momentum region 1 GeV/c to 100 GeV/c. But in our case the momenta of the particles recorded are 25 MeV/c and above. This shows that the variation of cosmic-ray fluxes with zenith angles does not differ for the momentum region 25 MeV/c to 1 GeV/c and 1 GeV/c to 100 GeV/c. The experimental data shows that nearly 80% of the cosmic-ray particles research the sea-level at the directions lying in between 0° and 40° degrees zenithal angles. Above 40° degrees the flux drops down very fast with increase of angles.

On the basis of the above experimental data the vertical, as well as, different directional components of cosmic-rays can be obtained from the total count by a single counter used in some experiments. The total solid angle covered by the counter is to be found out for obtaining the directional fluxes.

We offer our sincere thanks to Prof. Dr. R. L. Sen Gupta for his encouragement.

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